The Radio Amateur Society of Australia

QTC

September 2025

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You are welcome to join RASA or simply make a donation to support our work.

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Homebrew Cobweb made by Mike VK6MB (SK). Photo by Bob VK6POP

Contributing Items For QTCMagazine

QTC Magazine welcomes contributions for future editions. When planning to submit an article, please read our submission guidelines first.

Following the guidelines will save you and the editing team a lot of time and effort. The guidelines are **HERE**

From the President

Paul VK2APA

Lawn Bowls and Amateur Radio?

Living in Largs, I often visit the East Maitland Bowling Club, a thriving club that has some great food choices… Now what has this got to do with Amateur Radio you ask? Just hear me out.

I see a parallel between Amateur Radio and NSW lawn bowls clubs - let's have a look…

Some bowls clubs continue as they have since their heydays of the 50s through to the 60s and suddenly collapse under debt and lack of membership whilst others are thriving.

Why?

Poker machines and other gambling along with food and drink may bring in money, but this alone has not proven to be a guarantee of success and longevity.

Maintaining a bowling green costs approximately $20,000 to $25,000 annually for a natural grass green and $5,000 to $15,000 annually for a synthetic green according to Bowls Australia. Most clubs have two greens and some have three or more. The number of playing members is in decline and this is an expense that eats into the club's declining budget. Then there is the cost of maintaining buildings and other infrastructure.

To offset this, successful clubs are transforming themselves by incorporating activities beyond just bowls. They are embracing families, converting at least one green space into an outdoor dining or entertainment area, and providing enhanced dining options and entertainment. Those clubs are thriving!

Bowls Australia, the national body, is actively reinvigorating the sport to appeal to the younger generation and the clubs barefoot bowls is a fun social way for those who like to give it a try or do something different.

My point is that Amateur Radio clubs, groups and bodies need to reinvent themselves to continue to grow.

Amateur Radio was once a major force but now we must understand that there are many competing activities... Some are paralleling our own, such as the interest in pushing Wi-Fi technologies to their limits by the Maker Movement and their successors.

One comparison I stumbled across is the open source, off-grid, decentralised mesh networking on small, affordable devices, called Meshtastic. You can learn more about the protocol and how to get started at https://meshtastic.org .

Some Amateur Radio clubs are doing better than others. My local club, the Westlakes Amateur Radio Club, is very active and has maintained a high level of member numbers with its mix of social and technical activities.

Amateur Radio requires clubs, groups, and national organisations to rise to the occasion. Engaging in blame-shifting, excuses or relying on others to take action will lead to failure; therefore, the necessary change begins with each of us.

We need to slot into what people want and to reinvent ourselves... just like the NSW Bowling Clubs!

QTC

QTC
From the Editor

RASA Secures its Members' Privacy

Today it is difficult to do anything without having to send personal details into the void. Even the simple act of buying a ticket to a comedy show requires an email address, mobile phone and physical address. We should never feel obliged to provide more data about ourselves beyond what is essential to the task at hand.

From our inception in 2018, RASA has been clear that we *do* protect member privacy and only record the minimum that is essential to maintain membership. Name, email address and optional callsign. That's it. The information we receive is never shared with any other person or group. Certainly RASA has never approached clubs demanding their membership records to determine what percentage of their members are RASA members. That's none of our business. All clubs have a duty to respect their members' privacy.

This has become topical because we have been made aware via submissions that apparently some Australian clubs have been approached by another amateur radio representative body with a demand to upload club membership information to their on-line database in order to retain 'affiliation'.

Such models reek of the old-world guilds, institutes and brotherhoods that demand exclusivity from their members to survive. It does not have to be this way. There is always opportunity in any organisation for its leadership to move away from elitism.

It is unfortunate that this attitude remains a major point of difference between RASA and other organisations in our sector.

From its inception RASA decided to be inclusive. All of the books, videos and resources we produce are freely available to everyone.

Those who choose to join RASA do so because they want to support the position that Amateur Radio representation is for all, not just members or a specific list of clubs.

RASA members are of course free to join as many other groups they wish. Our members renew their membership and even make donations because they choose to be supportive and not because it is demanded of them.

As an organisation, it is an honour to respect that choice and to use every cent received in the pursuit of the survival and enhancement of our hobby.

An important part of this work is to respect the privacy of our members and any clubs we work with.

FreeDV Overview

By Peter Marks, VK3TPM

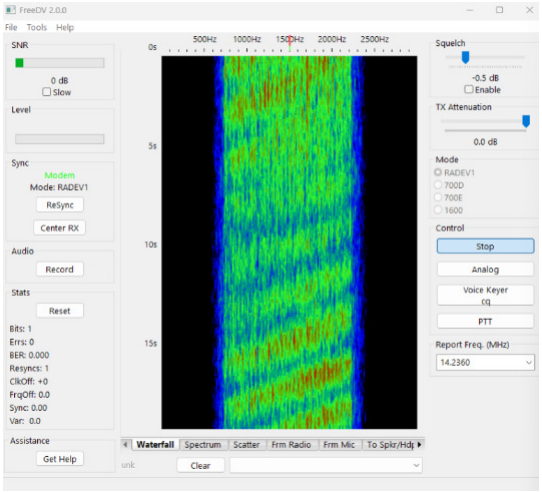
FreeDV is a cross platform, open source, app that can transmit speech digitally over HF radio.

The speech codec, which turns voice audio into a low bit rate stream was developed by David Rowe, VK5DGR. David did his PhD on low bit-rate speech codecs last century.

Codec2 is world leading, and the 700D mode can send understandable speech over a 700 bit per second channel which is amazing. But… the speech sounds somewhat robotic - rather like other low bit-rate speech codecs such as AMBE which is used on DMR.

The way it works is that rather than sending the actual audio waveform it uses hand crafted software to analyse the speech audio and extract "features" such as pitch, loudness and the spectrum. The bit-rate is much lower than would be needed to send the waveform. 3khz of audio is sent in 700 baud.

There's a modem used to send the bit stream over the radio. This uses multiple ODFM (Orthogonal Frequency-Division Multiplexing) carriers each transmitting QPSK (Quadrature Phase Shift Keying) bits. There's also some forward error correction bits added to repair the errors in the data from losses over the air due to interference and fading.



At the receiving end the bit stream is sent to a vocoder which turns the speech features back into speech audio.

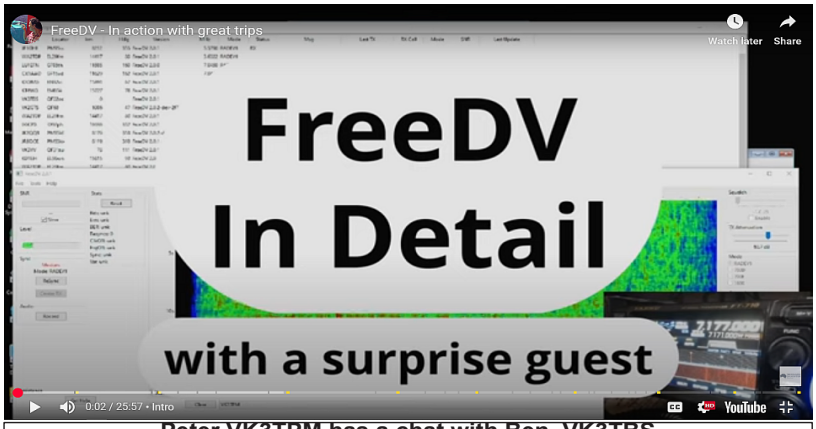
Recent advances in machine learning have improved the vocoder in particular. Jean-Marc Valin, developed FARGAN which is a vocoder that uses a machine learning model trained on sample speech and the feature data from it to create a much more natural sounding speech result.

Jean-Marc approached David Rowe with a proposal to also apply machine learning to the modem part of the system including the error-prone radio channel.

The latest versions of FreeDV include the radio autoencoder, called RADE. It uses a machine learning model that has been trained using reinforcement learning to transmit speech over a noisy HF channel.

The training uses 205 hours of speech, from which we extract "features" like the speech spectrum and pitch. We then train the RADE encoder and decoder to minimise the distortion in the features when passed through a simulated HF channel (fading + noise). The FARGAN vocoder then uses those features to synthesise high quality speech at the receiver end.

Interestingly the QPSK constellation it generates, which normally has four quadrants of phase and amplitude, just looks like noise to the human observer. We don't really understand how RADE is doing it.



Peter VK3TPM has a chat with Ben, VK3TBS

Using ML has made FreeDV's architecture look simpler as things like FEC and QPSK generation have been figured out by the model. The upshot is that RADEV1 works better than the hand crafted codec and sounds more natural and high fidelity than existing systems.

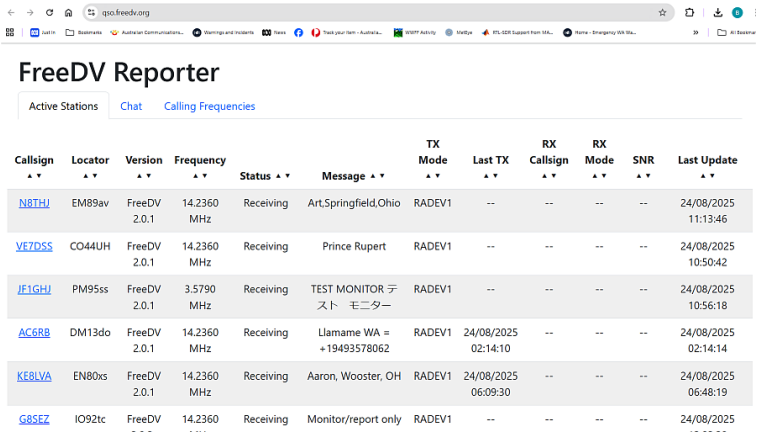
RADEV1 is currently implemented using the Python PyTorch ML modules which means that the FreeDV app must include a bundled python interpreter. Work is under way to not only improve how it works but also re-write the python in C so it will be more compact and easier to install.

FreeDV activity on air is slowly increasing and there are now regular nets in several parts of the world including Australia. They are listed on freedv.org page. I think it's particularly great for many people who suffer from local radio interference as they get good sounding speech with no background noise.

Peter Marks
VK3TPM https://blog.marxy.org/

See also:
FreeDV-036 Radio Autoencoder (RADE) V1
https://freedv.org/

FreeDV reporter is built in to the app, and you can see online who is active with FreeDV. Click on the image to see the site.


FreeDV Reporter

Active Stations | Chat | Calling Frequencies

Callsign	Locator	Version	Frequency	Status	Message	TX Mode	Last TX	RX Callsign	RX Mode	SNR	Last Update
N8THJ	EM89av	FreeDV 2.0.1	14.2360 MHz	Receiving	Art,Springfield,Ohio	RADEV1	--	--	--	--	24/08/2025 11:13:46
VE7DSS	CO44UH	FreeDV 2.0.1	14.2360 MHz	Receiving	Prince Rupert	RADEV1	--	--	--	--	24/08/2025 10:50:42
JF1GHJ	PM95ss	FreeDV 2.0.1	3.5790 MHz	Receiving	TEST MONITOR テスト モニター	RADEV1	--	--	--	--	24/08/2025 10:56:18
AC6RB	DM13do	FreeDV 2.0.1	14.2360 MHz	Receiving	Llamame WA = +19493578062	RADEV1	24/08/2025 02:14:10	--	--	--	24/08/2025 02:14:14
KE8LVA	EN80xs	FreeDV 2.0.1	14.2360 MHz	Receiving	Aaron, Wooster, OH	RADEV1	24/08/2025 06:09:30	--	--	--	24/08/2025 06:48:19
G8SEZ	IO92tc	FreeDV	14.2360	Receiving	Monitor/report only	RADEV1	--	--	--	--	24/08/2025

RASA - QTC FreeDV Evaluation Project

By Bob Bristow VK6POP

RASA will conduct an evaluation of FreeDV, the Open Source HF Digital Voice application for Amateur Radio. The outcomes will be published in a future edition of QTC Magazine.

We are looking at three to five participants, preferably placed a distance apart, who will commit to engaging with the project for a month.

Project Description:
To describe, test drive and evaluate FreeDV, and to provide a report to QTC Magazine for publication in October 2025. It is important to evaluate the product "out of the tin", assuming you have no prior knowledge of the product.

Assumptions: Participants have HF on-air capability, transceiver-computer interface for rig control and audio and a second "sound card" device, eg USB headset, soundcard dongle.

Method of evaluation:

Participants, preferably with no recent experience of using FreeDV, agree to:

- Download, install and configure the app. https://freedv.org/#download
- Listen for nets listed on the downloads page. In Australia there are nets on Sunday, 0030 and 1030 UTC, on 7.177 or 7.192
- Participate in team nets to be organised ad hoc as required
- Make notes, take screenshots and recordings to support writings.
- Evaluate your experience in the provided sheet
- Provide a summary of the experience. Try as much as possible to perform the install and setup "out of the tin", following instructions given on the website. Document why if you had to do otherwise. Keep it brief.
- Evaluate the on-air experience, particularly audio quality
- In a team net, we can compare using FreeDV with plain SSB voice.

I anticipate that those taking part will hold off installing FreeDV until given the go-ahead in order to keep everyone sort of together, and from there we will strike a timetable to test and evaluate. This should involve at least one attendance at one of the VK FreeDV nets, and at an evaluation team net to be arranged if needed.

If you have read this far, and are still interested in taking part in the evaluation, click on through to THIS FORM to register your interest.

I look forward to working with a small group of keen, interested people. And let's have some fun while we are at it. That's why we do it, yes?

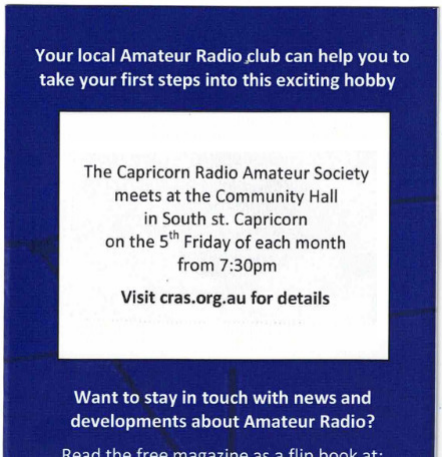
73, Bob VK6POP

The Welcome to Amateur Radio Brochure

Recently, RASA announced the development of a new “Welcome to Amateur Radio” brochure to promote Amateur Radio. This is a general-purpose flyer for any club or group promoting Amateur Radio, and it is available from RASA **at no cost.**

Whenever a group is promoting the hobby in a public space, they can have some of these folded brochures at hand to provide to curious onlookers.

Even though it is good for Amateurs to have a friendly discussion about what we do, it helps to give the person something to take away with them for later consideration.



Printed and Distributed

The brochures have been printed, and a sample amount has been mailed to Australian Amateur Radio Clubs. In fact, a bit over 2,000 brochures have been mailed to Australian clubs so far.

We’re asking clubs to discuss use of the brochure, and if you decide in the affirmative, simply contact RASA and we will send some to you.
As a further service, we will print a quantity of address labels (see left) for you to apply your club’s details to the brochure.

Do we have your club’s correct contact details?

Don’t miss out on this free offer. Head on over to RASA’s **Clubs Page** and complete the form at the bottom of the page, and we’ll update our club spreadsheet.

If your club would like to obtain some of these brochures, just send an email request to info@vkradioamateurs.org.

There is no cost to clubs, however donations to help offset the cost are appreciated.

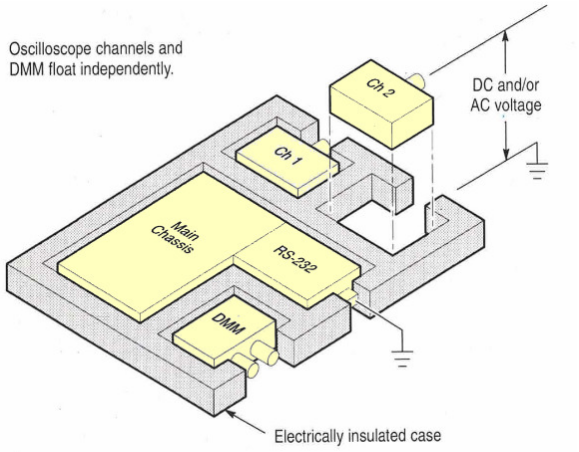
The Radio Amateur Society of Australia (RASA) vkradioamateurs.org

Scope for Improvement

By Ian Jackson VK3BUF

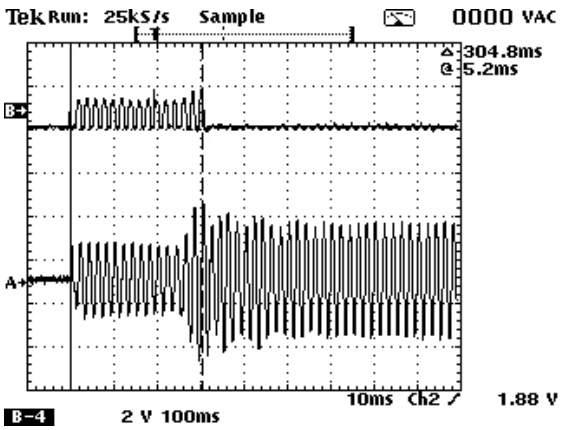
We all have our favourite tools. Sometimes it is a fine pair of pliers, or a hammer, perfectly balanced for hitting things hard. My favourite is the Tektronix THS720 portable oscilloscope, which to be fair, is quite poor at hitting things hard, but it can do pretty much anything else. These came out in 1996 and I picked up mine back in 2000. It was a good buy at $2,500 and has paid for itself many times over. In 2025 you still see the THS720 on Ebay, but the word is out and they continue to fetch $1000 - $1500 second hand.

"*What's the fuss?"* you may ask. "*See one dual trace oscilloscope, you've seen em all!"* But you'd be wrong. The Tekscope THS720 is the quiet, Clark Kent of scopes and first impressions are deceiving. I have a nice Keysight 4-channel 200MHz scope with a full colour screen on the bench, barely 18 months old. Still, I find myself reaching for the Tekscope most of the time.

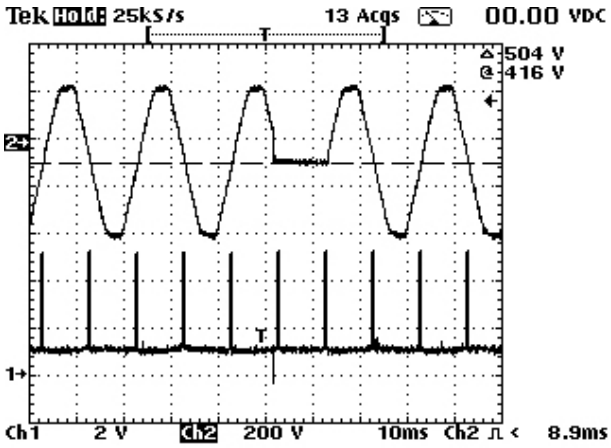


For a start, it's portable. I can use it up a ladder, or in a golf cart, or up a ladder on a golf cart. (but that's another story) It works with high voltages and its unique internal architecture means that it's fully isolated from Earth, even when on a charger. This allows me to put probes directly across two phases of a 415V 3-phase supply and capture AC motor start events.

The next awesome feature is the full isolation between the two input channels. That lets me do tricky things like measuring live mains and compare signals with microprocessor logic on the second channel. Try that with a regular scope and you'll spend the second half of a day filling in a crater where the equipment used to be. In this image it is has captured a motor start event on a 3-phase power converter, showing 5V microprocessor pulses that drive thyristors of the pilot motor, synchronised with a live converter output.



This brings us to the next feature. Its hold and storage features are really good. It lets the user capture brief events and save them to internal memory, then bring the saved image back to the screen and compare it with new live readings. The scope trace speed has a wide range from 500 nanoseconds to a very slow ten minutes across the 10cm screen.



Most scopes have moderately clunky menus and sub-menus that fight the operator for a useful image. The THS720 controls are fast and intuitive to the user. The 'Auto' button quickly gives a pretty good look at an unknown signal from a single press. Back in 2012 I was building 6kw mains voltage stabilisers where a matrix of relays selected transformer tappings while under full load. This is a scary thing to do, but using this scope I was able to train the software to synchronise relays with zero-crossing points so we only lost a half-cycle with each transition, without any sparking of contacts.

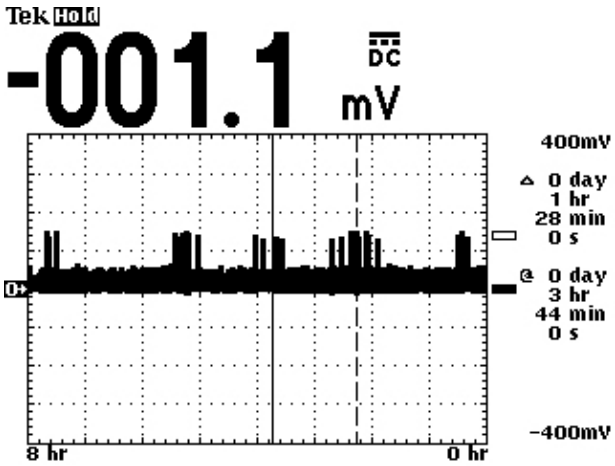
Here we can see mains synchronisation against a live, relay switched AC supply.

But wait…there's more!

Better than steak knives, the THS720 has a full true RMS digital multimeter terminals built into the side. This multimeter feature has full 3kV isolation from both oscilloscope channels, plus the meter input can also be used as an external trigger for the scope screen.

Another cool feature of the multimeter is the ability to show slow voltage changes over time. One side of the screen to the other can take 4 minutes, or be set to as long as 8 days. This lets the unit behave as a data logger. I once hooked it up to the signal strength meter on a 6 metre rig to see how much traffic the repeater had in an 8-hour period.

The result looked like this:



The THS72 has an RS232 port, which oddly is an RJ45 socket that looks like a network connection. This can connect to a serial printer, or with a capture program, save screens to a .bmp file, which is how the above images were produced. A great feature for documenting your work.

And now the bad news…

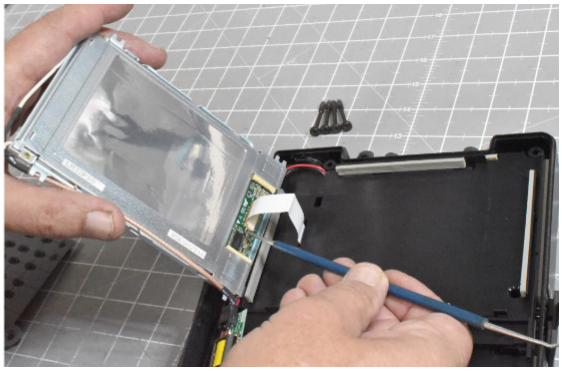
Any instrument that has been flogged for 25 years is going to show a little wear. Mine had a dodgy battery and I had to re-build the pack with four C-cell rechargeables. That was a fairly straightforward process. There was another problem. Over the past couple of years it began to suffer what could be badly described as a *macular degeneration*. The centre of the LCD screen went dark as the filter material slowly broke down.

It began to look like this

Once the problem began, it deteriorated rapidly. There is no real fix for this other than to replace the entire display. Often the act of replacing a proprietary display in older equipment can be really difficult and hard to find. In this instance the product was almost thirty years old and that worried me.

I was pleasantly surprised when I found that new, genuine displays were available from an LCD store in Shenzhen China for about $185. After a 2 week wait the package arrived. The next step was to crack open the scope and remove the defective display,

Four screws in the rear allowed the cover to be lifted to one side. The display was attached by a flat ribbon strip. A plastic collar had to be elevated with a pointy tool to relieve the ribbon cable lock. After that came the high voltage connection to the CCFL screen backlight. This simply unplugged.



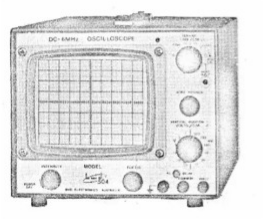
The repair went smoothly and the entire upgrade only took about fifteen minutes. Once power was applied, it was business as usual, but with a high contrast screen and full brightness backlight, the way nature had intended the screen to be. The picture at the top of this article shows the scope with the new screen fitted and with the old display to one side.

When I was a lad, we had it tough…

From the perspective of test equipment, we live in fortunate times. My first oscilloscope was an Australian made BWD504, manufactured only a few kilometres from where I lived in Melbourne's suburbs. 6MHz, single trace. In 1977 it cost a lot of money for a first year apprentice. Aye, we had it tough. Very basic, but it did a lot of good work. It had no storage features, however if I turned the intensity up really high and darkened the room, a single pulse event would remain on the phosphor screen for a few seconds through persistence. The sort of kit we can buy today at 2025 prices would have been the stuff of science fiction back then. You try telling that to the young people today, and they won't believe you.

Real men use monochrome LCD screens

If you want something nice for the shack, flick through a new catalog and pick out a flash new scope with a colour screen and a bunch of buttons. You'll have plenty of fun with it. But if you want a workhorse that will take a lot of punishment and do weird work that would kill most scopes, scan the secondhand market for a good THS720 and kick some quality waveform butt.



BWD504

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Tektronix THS720

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The RASA 2025-2026 Membership Renewal Month has been busy

While applications and renewals for RASA membership are accepted at any time during the year, we do try to concentrate these to the month of August. If you have previously sent a membership contribution to RASA some time this year, you are covered until September, 2026. If this has slipped past your busy schedule, then it is still ok to send your membership contribution now. We still only ask $10 per year of our members. It is absolutely awesome when members who are comfortable in doing so, choose to donate a little extra. This helps us a lot and lets us increase the promotion of our exciting hobby. If you are unsure if you are financial or not, just slip an email to info@vkradioamateurs.org and we'll check it out for you.

August this year was very successful and a big shout out to those who went to our website and made a Pay Pal contribution, or made an EFT transfer direct to the RASA account. We try to respond to each payment with a reply email within 48 hours of all payments that arrive.

The details of how to pay are all on our website at: https://vkradioamateurs.org/contact/ or simply click on the image below.

There are a couple of relevant points for everyone to be aware of:

- RASA does not paywall any of its resources or magazines. We are not (metaphorically) holding a gun to anyone's head to pay up to receive services. People remain RASA members because they *want* to be part of a community that promotes our hobby and not because we insist on membership.
- All member contributions and donations go towards the aims of RASA. It is run entirely by unpaid volunteers.
- We only retain a Name, a Callsign (if any) and an email address. That's all. We never share this information with any other groups or organisations.
- Members will receive notification links with the launch every new magazine edition and special events, such as the lead up to the AGM.

Thank you all for taking the time to renew your membership for 2025. it really makes a difference.

Hello Gents,

I wonder about the possibility of running a poll in QTC, asking amateurs what is their personal number one regulatory issue that affects them.

There are obviously a few leading issues, high power, 60m and licence document for example.

I know I'm a bit curious as to what others see as a main issue, it would make an interesting discussion point.

The results might also be useful for RASA's lobbying efforts.

There are a million ways the question could be asked and results collated, and I don't have any particular insight, but I would make it open to all hams and not just RASA members.

Cheers
Richard Sawday
VK5ZLR

Thanks Richard for your letter and your insight.

We'll seriously consider your suggestion. The results, which would reinforce our understanding of what is important to Amateurs, would be useful to us in our work.

All of RASA's efforts are on behalf of all Amateurs, and the resources we provide are free of charge, and available to members and non members alike. We do not support exclusive practices.

RASA will not force anyone to become a member in order to access its services. Membership of RASA is entirely voluntary.

Ed.

Is Your Club Information Up to Date?

By Bob VK6POP

Return to Sender.
No, not the Elvis song of woe.

How does someone discover your club, and how accurate is the contact information that they find? When you think about it, if your club is keen to put itself "out there", it's essential to provide contact information. That makes sense, doesn't it?

Your contact information is on your website, community directories, social media and other places. That is a good and proper thing.

However - and isn't there always a "however", it must follow that the address that you put out there is real. That a communication to that address is received and responded to.

Let me tell you what brought this topic to my attention. One of RASA's current projects is distribution to clubs of a brochure designed to help clubs bring newcomers to the hobby. The first part of distribution was to send a letter and a sample number of brochures to all Amateur Radio Clubs that we are aware of. Last year we updated our clubs contact list, specifically for this sort of thing.

Letters were sent by snail mail - you know, envelopes, stamps etc. Some came back marked "Return to Sender", "Not Known at this Address" and so on.

Further investigation revealed some very interesting things.

Post Office Boxes.
For years, clubs have used a PO Box as a service to members to avoid having their private address published on the ACMA Register of Radio Licenses, a publicly viewable database. Recent changes by the ACMA to comply with privacy laws mean that our personal details are no longer published. Coupled with the reality that most correspondence is conducted via email, Clubs are abandoning their PO boxes. What do they now use for a postal address?

Using Private Addresses.
Many clubs use a fixed club address, so that as office bearers change, the public address stays the same. The P.O. box fixed that. But use of these boxes is declining. If the club is lucky, mail can instead be received at the location where their meetings are held.

Otherwise, providing a postal address is a real issue. Clubs resort to changing their postal address to the secretary's home address. This works but it can become messy as time goes by.

Why does it become messy? After all, Fred has been the secretary for twenty five years, what needs changing? To put it simply, Fred will eventually become incapable of being the secretary. He's passed away or gone into care. So Harry is elected as secretary, and the expectation is that the club's postal address is at Harry's place. That IS good, isn't it?

It may be good if the club remembers by whom and where Fred's address is kept as the club's postal address, and makes all the changes. The reality will most likely be that nobody does remember, and the old, now defunct postal address is "out there", possibly forever.

In one recent example, the club had abandoned the P.O. Box, however this has not been changed on RASA's club list, and not at the WIA's club list, and not on the club's own website. Emails to the club's advertised email address, secretary@thatclub.org.au, copy to president@, have not been responded to.

Let's not think ill of that club, and for that reason there will be no naming. You see, this is a very common problem, because not only do clubs put their contact information in certain places, that information sometimes is copied by a third party. And sometimes it's more difficult than it ought to be to amend the information.

Probably the easiest thing that a club can do NOW, is to make sure that their own website is up to date showing correct contact details, and that if using club emails(secretary@ etc), that these are properly configured and monitored.

RASA makes an effort to maintain its clubs contact list (by the way this list is not available publicly). It is a huge task, and for all the reasons stated above there is always an address or two that are not correct.

You can make sure that our contact list is current for your club by filling out the simple form on this page https://vkradioamateurs.org/clubs/. There is no login required. You give us the information, we update our list.

Meanwhile, do give some thought to how you can tidy up the information about your club that is available "out there". Make sure the information includes the club's now up to date website address. Wouldn't that be a good project for someone?

Radio for the Curious & Creative

The Radio Amateur Society of Australia

FSK and PSK - Understanding the Difference

By Paul Anslow VK2APA

FSK and PSK are two common digital modulation techniques used in amateur radio to transmit digital data, such as text. Both methods encode binary information (1s and 0s) onto a radio wave, but they do so by manipulating different properties of the signal.

Frequency Shift Keying (FSK)
FSK represents data by changing the frequency of a carrier wave. In its simplest form, called Binary FSK (BFSK), a “0” (Space) might be transmitted as one frequency and a “1” (Mark) as another. The difference between these is referred to as “Shift”.

AFSK (Audio Frequency Shift Keying):
This technique generates an audio tone that represents the digital data, which is then sent as a standard audio signal. Modern transceivers often use this approach via computer sound cards connected to their microphone or auxiliary input to receive and generate all variations of FSK and PSK.

Amateur radio modes that use Frequency Shift Keying (FSK)

RTTY (Radio Teletype):
Amateur radio teletype (RTTY) uses an audio frequency shift (AFSK) between two tones to represent digital 1s (MARK) and 0s (SPACE), with the standard shift being 170 Hz. Most Amateur RTTY uses the Baudot code, which is a 5-bit code

While older RTTY used a wider 850 Hz shift, the narrow 170 Hz shift is more common today for amateur radio, allowing for better efficiency and narrower reception filters. A common speed for amateur RTTY is 45.45 baud, and a computer and sound card interface like a SignaLink USB or a shack built one, are typically used for transmission and reception.

Originally Amateurs operating RTTY used surplus Military teletype equipment, then evolved to using computers (AFSK). Some transceivers are capable of generating the Mark and Space tones.

Packet Radio:
A more advanced FSK mode that sends data in error-checked blocks or packets, allowing for store-and-forward messaging and bulletin boards. This mode was in response to the availability of home computing.

AMTOR:
An FSK mode that uses error detection and a request for retransmission, improving reliability over RTTY, especially in poor conditions.

Pactor:
A family of FSK modes (like Pactor I) that use error control and higher speeds than RTTY to provide robust data communication.

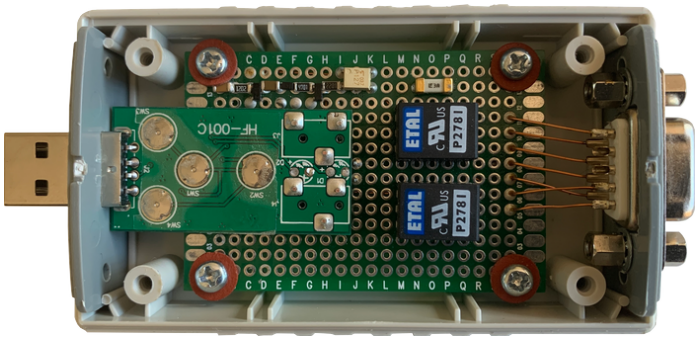
Amateur radio modes that use Multiple Frequency Shift Keying (MFSK)

More advanced forms of FSK like Multiple FSK (MFSK) use a wider set of frequencies to transmit multiple bits per symbol.

FT8, JT65, WSPR, and Olivia
These are examples of "below-the-noise-floor" modes that employ MFSK to achieve reliable communication in extremely weak signal conditions.

Advantages:
- Resistant to noise and interference.
- Easy to implement with simple circuits.
- Common in radio teletype (RTTY) and low-power devices.

Disadvantages:
- Less bandwidth-efficient compared to PSK.
- Requires more spectrum for higher data rates.



A simple Interface from the transceiver to a computer. Click for detail.

Phase Shift Keying (PSK)

PSK, by contrast, represents data through changes in the phase of the carrier wave. In Binary PSK (BPSK), the carrier's phase shifts 180° between "0" and "1". More advanced versions like Quadrature PSK (QPSK) and 8-PSK allow multiple bits per symbol by using four or eight distinct phase shifts.

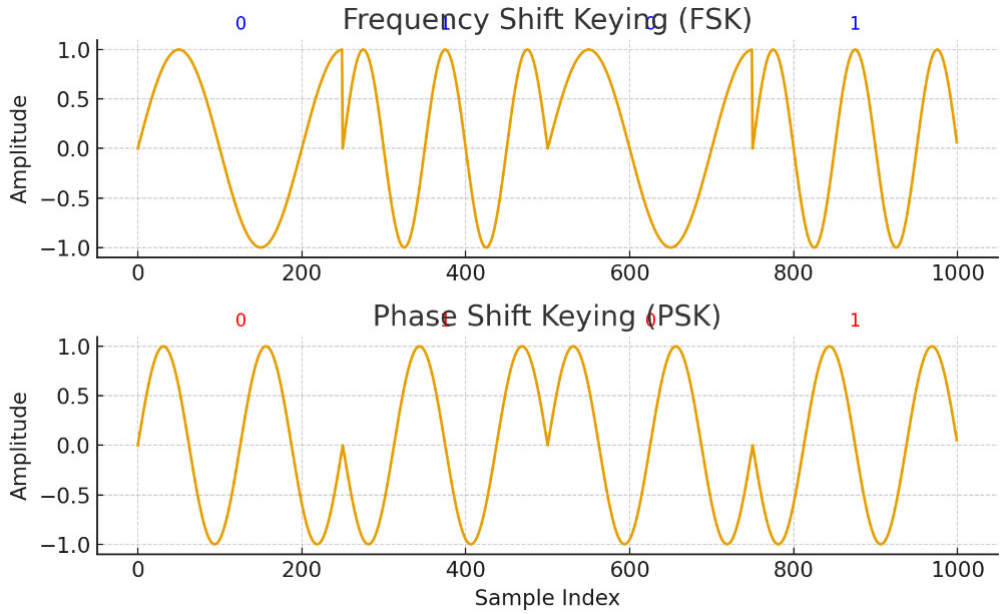
Amateur radio modes that use Phase Shift Keying (PSK) include PSK31 and PSK64,which uses a very narrow bandwidth for efficient weak-signal communication.

Advantages:
- Highly efficient in terms of bandwidth and power, making it great for low-power weak-signal communication.
- Widely used in Wi-Fi, satellite, and 4G/5G systems.

Disadvantages:
- More sensitive to noise, interference, and frequency drift.
- Requires more precise tuning and a stable transceiver.

Key Difference

The essential distinction is that FSK encodes data in frequency shifts, while PSK encodes data in phase shifts. This means FSK is generally more robust in noisy, low-power, or narrowband environments, while PSK is preferred where bandwidth efficiency and higher throughput are critical.



Conclusion

Both FSK and PSK remain vital in todays communications, each chosen based on trade-offs between robustness, complexity, and efficiency. FSK still thrives in legacy and low-power applications, while PSK underpins much of today's commercial high-speed digital communication systems.

VK3RASA
REVERSE BEACON NETWORK
Located in Drouin West, Victoria, Australia.
RASA

Amateur Radio Meets Community Radio

RASA at 'The STEM Zone' Experiment

By Robert Nicoll VK3LOL

On Saturday, 9th August, RASA was invited by Paul from 3BBR West Gippsland Community Radio to participate in 'The STEM Zone' Experiment – the second of what looks set to become an annual event at Lardner Park, near Warragul, VIC.

We hosted a table and debuted our new table cover featuring RASA's fresh slogan: "Radio for the Curious & Creative."

Wendy (VK3WEN) and I (Rob – VK3LOL) spent the day introducing passers-by to the many ways amateur radio can spark curiosity and provide opportunities to experiment with electronics and communications.

The event attracted a strong turnout from local families, with a wide range of exhibitors – including the Army, Navy and Air Force. A midday highlight was a thrilling display from two RAAF Roulettes.

The 3BBR outside broadcast suite, set up by Garry Havrillay and Paul Strickland, went live from 10am. José Meyer hosted My Kinda Music to start the day, with Paul and Garry following up from noon with a mix of suitably "sciency" songs and live crosses to Paul as he explored the event.

Although our station was effectively inside a Faraday cage – and the heavy demand on 4G/5G made comms tricky – we still managed to demonstrate some fun aspects of the hobby. Wendy even sent photos of our cat using D-STAR picture mode into the IC-705 on display, which was a hit with the younger visitors!

One of the biggest drawcards was an RTL-SDR receiver tuned to 3BBR, showing both the RF and audio spectrum of the station broadcasting just metres away.

We also handed out copies of RASA's new flyer, Welcome to Amateur Radio. Several were taken, and interestingly, many of those who stopped by for a chat were current or former Army personnel.

Being my first time hosting at an event with a younger audience, I picked up a few useful ideas. RASA member Ian (VK3BUF) suggested adding a small "fox hunt" game, labelling equipment so it isn't just a table of anonymous gizmos, and including a straight key with an oscillator for some hands-on fun. Great suggestions for next time.

RASA is excited to keep promoting amateur radio across Australia. We welcome opportunities – and assistance – to showcase the hobby and ensure it stays active, engaging, and relevant in the 21st century.

RASA Supports Hamfest in W.A.

RASA had a presence at the NCRG Hamfest in Perth on 31st August. RASA VP Bob VK6POP set up and manned the table for the duration of the event.

RASA Club Support

RASA provides support to clubs by offering these free resources:

- A brochure to be used as a tool for introducing new people to the hobby. Ask about it HERE
- Foundation Level Study Guide and the Welcome to Amateur Radio Guide Book both available from our WEBSITE
- Clubs that provide training, especially Foundation Level, may advertise their training in the Foundation Level Study Guide. Enquire HERE
- QTC Magazine - published monthly. See HERE
- Presentations about our work to clubs, either in person or via ZOOM. Ask about it HERE
- Where practicable, holding a table at local hamfests. Invite us
- Free acces to QTC for clubs to promote their activities and events. Ask how HERE

RASA's services to Amateur Radio are provided free. We don't require membership to access RASA resources, however new members are welcome.

Take advantage of free club advertising in QTC. Once you've placed your advertisment, you can multiply its effectiveness simply by promoting QTC at your club, on your website, email reflectors and socials.

To contact QTC Magazine, click on the image above.

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Contests Coming up

How do you know when contests are on?

There are Amateur Radio Contests happening around the world almost every weekend of the year, and you would be a very brave person to attempt them all. You can, however, pick and choose, according to your interest and capability. If for nothing more than curiosity, visit the contest calendar maintained by Alan VK4SN - its HERE.

Coming Soon

OceaniaDXcontest

Probably the next contest to attract the attention of the more casual Australian contester is the Oceania DX contest, with the SSB contest on 4th and 5th October, and the CW contest on the following weekend. Find out all you need to know at https://www.oceaniadxcontest.com/. The idea of an international contest might be daunting for some, however you just take it as it comes, you'll be fine.

Contests provide a good learning opportunity, especially for newcomers to the hobby. Contests provide good solid on-air time, honing up microphone skills, and learning how to handle a pile-up. All good skills to go towards other on air activities such as chasing DX, working the outdoor activities such as POTA, VKFF, SOTA and so forth.

Get your club active

Is your club shack gathering dust through lack of use? Contests like this provide an opportunity for a successful club activity with not much to organise, assuming the club shack is functional. And there lies another opportunity for activity - preparing the shack for a contest. And let's be clear. It doesn't matter if you don't win the contest. You will do well with a satisfactory score if you can keep the station operating non stop for the full twenty four hours.

What if you do not have a functional club shack? With a little more work beforehand and a bit of equipment borrowed from members, and a friendly venue such as a scout hall, the club could be on air fairly easily.

Which Section or category of the Contest?
A lot depends which contest you are looking at. Some contests have a complex array of categories, and you should decide which category suits your equipment and your capability for that weekend. The best advice is to read the rules, then make up your mind.

Just Do It

Remember the most difficult move is the first one. That is getting off your collective backside and deciding to do it.

RASA DX Contest

It's not too late to enter the RASA DX Contest, even though we're halfway through the year. Read on to find out why.

The objective of this contest is to encourage greater participation and activity on the MF, HF and 6 metre bands. The contest is deliberately designed as a long form event, as many amateurs are unavailable for the more traditional contests held on weekends.

It also provides the opportunity for those who like to operate in a more relaxed fashion to still take part in a national contest. This also allows amateurs the opportunity to use their 2×1 Contest Callsigns, a great way to attract the interest of international stations.

The simple rules and how to enter are listed **HERE.**

You must use ClubLog for scoring, and instructions are on the RASA website.

Radio for the Curious & Creative

The Radio Amateur Society of Australia

Join Us
RASA
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New Members Always Welcome
Would You Like to Assist With Our Work?
Email info@vkradioamateurs.org to enquire
Click HERE to Join, Renew or Donate
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QRM.guru
Resolving interference for Amateur Radio
QRM.guru was developed to assist Radio Amateurs to deal with RF noise and interference.
It is an educational and reference resource. The information provided on the pages is not unique or regarded as a new discovery. QRM.guru is a volunteer powered resource.
Click on the image to visit the QRM.guru site
https://qrm.guru/

Icom 7300 Mk11 Announced

The IC-7300 MkII recently announced at the JARL Ham Fair 2025, is an upgraded version of the original Icom IC-7300 transceiver, which was released in August 2025.

Key enhancements include an HDMI port for external displays, a built-in CW decoder, a USB Type-C port with dual virtual COM ports, and enhanced remote control capabilities via a built-in LAN port and Wi-Fi. The MkII also boasts improved RMDR (Reciprocal Mixing Dynamic Range) and phase noise, a new antenna noise reduction system, and a cooler-running design for extended use.

Key Features of the IC-7300 MkII:

- HDMI Port: Allows connection to an external monitor for a larger display.
- Built-in CW Decoder: Enables decoding of Morse code signals directly on the radio.
- USB Type-C with Dual COM Ports: Offers dual connectivity for logging software and other applications simultaneously.
- Enhanced Remote Control: A built-in Ethernet (LAN) port provides server functionality for remote operation, eliminating the need for a separate base station computer.
- Dual Receive Antenna Connectors: Includes a standard transmit antenna connector and an additional receive-only connector for improved low-noise reception with a separate antenna.

- Improved Performance: Features enhanced RMDR, phase noise characteristics, and a new receive noise filtering system.
- Cooler Operation: Designed to run cooler for longer periods of use, suitable for contesting and extended operating sessions.
- 70 MHz Band: The European version of the MkII includes the 70 MHz band.

The IC-7300 MkII replaces the highly successful IC-7300, which was first introduced in 2015 and sold over 100,000 units.

View Icom's announcement and slideshow HERE

Way Back Then

From the Daily Mail, Brisbane, Qld, Saturday 21 October 1922

AMATEUR RADIO.

With the growth of wireless broad casting stations and the Introduclion of cheap and simple receiving sets, the regular reception of wireless concerts and news is becoming the privilege of the radio amateur.

Apart from the Commonwealth scheme to establish a direct high-speed wireless commercial service linking all the Australian capi-tals with Great Britain and North America, there Is a movement to rent out to subscribers portable outfits that will enable dwellers In city or bush to listen to distant musical entertainments, and to receive official time signals, and market and weather reports.

Even without the aid of these Imported sets, which are to be hired out in much the same way as ordinary telephone Instal lations are at present, it will be easy for the ambitious amateur to enjoy the broadcasted entertainments, for a home-made receiving set can be con-structed for a few shillings without the possession of any considerable techni cal knowledge.

The future possibilities of wireless are practically unlimited. The way In which even the amateur has recently benefited by It Is vividly Illus trated by the following comparison. On December 24th, 1814, the Treaty of Ghent was signed, bringing to an end, amongst other things, the Anglo-Ame-rlcan war of 1812. But on January 8, 1815, 15 days after the diplomats had amicably settled the questions at Issue, the most spectacular battle of the war was fought at New Orleans.

Had there been any way of doing so, the respec tive Governments would doubtless have notified Generals Pakenham and Jack-son of the state of armistice. But the contending armies were not alone in their ignorance of epochal passing events; the public of Britain and Ame rica were equally in temporary dark ness.

Compare that ignorance through, lack of direct communication with the spontaneous news distribution that ac companied a battle ol a very different sort that was waged a little more than a century later. On July 2, 1921, the Dcmpsey-Carpentier fight at Jersey City was broadcasted.

By means of the wireless telephone, a complete "punch by punch" summary of the melee was sent over the ether from the arena, so that radio amaleurs anywhere within a range of several hundred miles were better informed of the progress of the fight than were the occupants of the more remote stadium seats.

Sporting Events lend themselves with particular facility to this sort of in stantaneous news transmission. During a recent series of big baseball matches

In the United States, the pioneer Westinghouse station radio-phoned to Count less amateurs every ball, strike, and other play immediately they occurred.

The radio concerts arranged nightly in some places are varied and attractive. Apart from the regular items by lead ing vocal and Instrumental artists, some broadcasting centres offer dance music on Saturdays, and sacred music on Sun days.

Other features Include the dally distribution of world news, children's fairy stories, and occasional lectures and sermons.

In Australia this form of entertainment and Instruction is only in its Infancy, but the radio concerts that have already operated in Melbourne, Sydney, and Brisbane show that a fine field for exploitation in the near future Is here provided. It is anticipated that by the end of the present year a growing number of suburban and country residents in Australia will enfoy weekly radio Concerts. If radio has benefited the amateur, the amateur has also benefited radio.

An amateur is literally a lover, and those who ardently experiment In this science at their own cost and for the sheer love of probing its store of marvel and surprise are always likely to hit upon Improvements.

Many of its advances have been made possible by the researches of non-professional zealots. Thousands of radio operators for war work were recruited from the army of the amateurs, and some notable refinements in the well-known regenerative vacuum-tube circuits, and in the latest sets for airplane use, were discovered by those to whom radio had been merely an engrossing hobby.

The notable contributions to wireless progress from non-professions sources should ensure for such experimenters as much freedom as is consistent with national safely.

Yet, In Australia, war time wireless restrictions have been lifted very tardily from the enthusiasttic shoulders of the amateur. It is right that wireless operations should be reasonably controlled by the Government, but that control could effect needed national safeguards by nothing more irritating than the licensing of amateur distributing stations, and the fixing of a fair limit for the length of their electro-magnetic waves.

The amateur has one advantage over the professional scientist In that his comparative ignorance often leaves - him undaunted In face of problems that are expertly deemed insurmountable. Fools rush In where angels fear to tread, and sometimes their very foolhardiness leads them to a rare victory.

The other day some amateurs, who were no fools, but lacked professional caution, conceived the Idea of spanning the Atlantic Ocean with the short electro-magnetic waves legally permitted to them.

Their transmitting plant in America only had 50 watts of electrical energy, equal merely to the power of the average electric light — and many wireless officials were openly scornful of that trivial outfit's ability to crackle any message across 3600 miles of ocean.

But, like Columbus before the deriding pundits of his day, the amateurs went ahead with their trials, and actually succeeded In their aims. That has been rightly hailed as a marvellous feat of signalling which is not likely to be lost upon scientists and engineers in all parts of the world.

The radio amateur has certainly proved his right to generous treatment at the hands of the Government.

Ed: A good story. Wasnt' the language of the day very flowery?

Resources for New Amateurs

Like all RASA resources, the FLSG is free, and we encourage you to share it with your club, friends and others who may be interested in becoming a radio amateur.

This resource is backed up by our other award-winning resources, including QRM Guru, the Welcome to Amateur Radio Guidebook, and VKRegs.

This resource is unique. Not only is it up-to-date with the latest information on the Class Licence, but it includes tailored instructional videos, links to useful websites, and extra “good to know” learning opportunities. All of this is backed up by a Knowledge Base with an integrated email-based helpdesk. So if you have feedback or questions, you can easily raise a ticket.

The FLSG is available HERE

The RASA Welcome to Amateur Radio Guidebook provides an introduction to our hobby for new Foundation class amateurs.

The book is published digitally. It contains many hotlinks to external websites with useful information.

It is available as an Acrobat pdf file suitable for reading on a PC or tablet. It can be printed if required.

Download the guidebook HERE.

Dits n Dahs

by Chris VK3QB

Some thoughts on working DX - and VK9NT Norfolk Island

As amateur radio enthusiasts we have free access to an incredible range of the RF spectrum. Those of us who spend time on the HF bands will attest to the wonder of RF and propagation. You can never be sure what the ionosphere will serve up.

We are (mostly) creatures of habit. We have our favourite bands, skeds, times of day, etc, and it can be easy to fall into the comfort of a predictable routine. HF radio offers a great opportunity to challenge those habits and really have some fun. Call it the magic of radio.

Spin the dial.

Last Sunday I received a text message from a friend: “check out 17m it’s on fire”… I can’t remember the last time I was on 17 metres. Well, my normal habit has me on 40 or 20 metres, but I decided to match the 40-metre doublet and *spin the dial* on 17 metres.

I started about 1200Z and over the next sixty minutes I was lost to the magic of radio. It started with a few European Russians, then some Japanese and a Philippines station, then swung back to Europe with a couple of English stations, then Mark from Ange in Sweden and a couple of Germans. About 80% of the QSOs were ops responding to my CQs.

The opening was sufficiently strong that my dipole (10 metres high) and 100 Watts was more than enough, with most stations reporting readability 5, even if signal strengths weren’t S9. And pretty much every QSO followed the standard DX protocol. Some were a simple “569, op is Vlad - tu 73”, but a few extended to include QTH, a weather report and a basic description of the op’s station.

Here I am, 42 years since my first QSO, and I still marvel at the magic of HF radio. It still amazes me when I report the temperature at 5c here 100km SE of Melbourne, and Ken (250km SW of Tokyo) reports a hot and sticky 35c. It might seem fickle in the age of Social Media, “free” messaging and voice apps, and news-on-demand, but none of that offers the magic and surprise of an unknown response to a CQ on HF.

The following night’s conditions were similar. The opening wasn’t as long and the signals weren’t quite as strong, but I worked another seven DX stations from JA to SM.

So, I encourage readers to *spin the dial*. The sometimes-random nature of propagation can serve up all sorts of surprises. Don’t feel intimidated. Even if the speed is a little above your comfort zone, remember, most DX QSOs follow a pretty standard protocol. The added bonus is that you’ll be pleasantly surprised at just what you can copy – and the very best way to improve your CW is to challenge yourself.

CW Ops

This weekend (6 September) is the CW Ops Open Contest. Now, contesting isn't for everyone, but this contest is a bit different. It's made up of three four-hour sessions. Personally, I think this is a great idea. It enables operators to participate in all three sessions, or just one or two. You don't have to commit a whole 24 or 48 hours to the contest.

If you are even a little bit competitive, check it out and enter one session. And even if you're not a contester, *spin the dial* and have a listen. **Contest Details Here.**

Norfolk Island VK9NT

I'm off to Norfolk Island (VK9NT) on 14th September with Luke VK3HJ and Alan VK6CQ. Since I'll be there for the normal monthly Zoom session, I thought readers might be interested to join the Zoom session and see our station first-hand. Luke VK3HJ and I will walk through the set-up and provide some hints 'n tips for breaking pileups. **Meeting Details Here**.

If you're free, please join us. We'll also run a Q&A session. We are on the island for two weeks and it's always great to have QSOs with our fellow VK ops just a short hop over the water. For those on the east coast, Norfolk Island is a very easy chip shot. Maybe set yourself a challenge and see how many bands you can work us on.

Our technical topic this month will be "busting a pileup". If you have an interest in DXing and chasing rare ones come along and have a listen.

If you have any questions or want to know more, just drop me an email. I hope to see you at the next Zoom Session or hear you on-air.

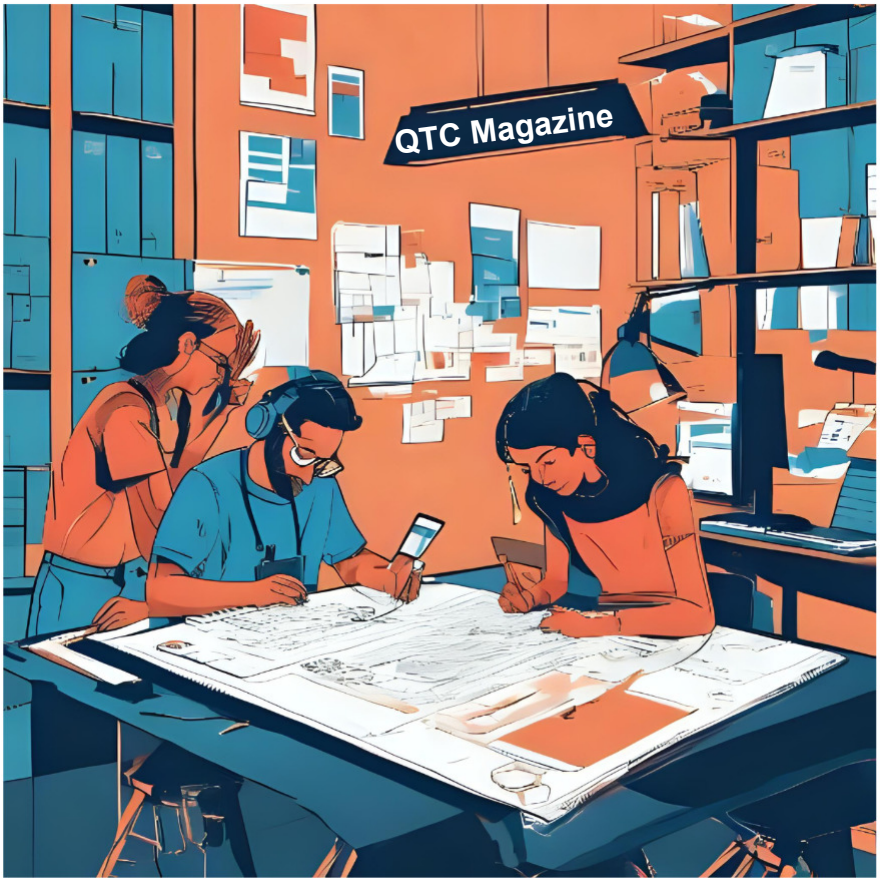
Vale Kirsti Jenkins-Smith VK9NL

It is with sadness that I report the death of Kirsti Jenkins-Smith VK9NL. Kirsti was a long-time resident of Norfolk Island and the wife of Jim Smith VK9NS (SK). Vale, Kirsti Jenkins-Smith, VK9NL, an accomplished woman, from shipboard Radio Officer to internationally known DXer from Heard and Norfolk Islands with Jim Smith. A champion to Radio Amateurs around the globe.

73, Chris VK3QB, #2949
CW Ops OC Ambassador
https://cwops.org/

Join the QTC Team

Would you like to be part of the QTC volunteer production crew?



QTC Magazine is produced by RASA, the Radio Amateur Society of Australia. QTC is used by RASA to provide information about the services we provide, keeping you informed about what's happening in the Amateur Radio regulatory sphere, general news about Amateur Radio actiities and events in Australia.

What would we expect of you?

- Commitment to RASA's ideals and principles
- Willing to learn. You may have to learn new skills/methods, or adapt existing skills.
- Unlike the team portayed above, you won't be poring over a paper driven layout table. We are online and interactive.
- We are looking for regular contributors - writing light tech articles, writing and collecting general interest stories, submitting photos, proofreading. Any or all of those would be great.
- We'd like you to have experience with basic Desktop Publishing, or to be willing to learn(there's a bit of a learning curve, depending on your previous exposure)

Enquire by email to RASA and we'll start a conversation about what you could do on the QTC team.